VIKING PUMP

TECHNICAL SERVICE MANUAL

UNIVERSAL MAG DRIVE PUMPS

SERIES 8124A, 8123A, 8127A

SIZES K, KK, L, LQ, LL, and LS

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FIGURE 1
MODEL LS8124A-325

WARNING!

Persons with surgical implants of a metallic or electronic nature should avoid working on pump – especially the inner magnet assembly.

This information must be read fully before beginning any maintenance or repair of the pump. All maintenance or repair must be done by SUITABLY TRAINED or qualified persons only.

INTRODUCTION

The illustrations used in this manual are for identification purposes only and cannot be used for ordering parts. Obtain a parts list from the factory or a Viking® representative. Always give the complete name of a part, the part number and material, along with the model number and serial number of the pump when ordering repair parts. The unmounted pump or pump unit model number and serial number can be found on the nameplate secured to the pump.

This manual refers only with Series 8124A, 8123A and 8127A universal magnetic drive pumps. Refer to Figures 1 through 17 for general configuration and nomenclature used in this manual. Pump specifications and recommendations are listed in Catalog Section 635.

In the Viking model number system, the basic size letters (K, KK, L, etc.) are combined with the series number (8124A, 8123A, 8127A) indicating basic pump external construction material, see **Figure 3**.

SPECIAL INFORMATION

DANGER !

Before opening any Viking pump liquid chamber (pumping chamber, reservoir, relief valve adjusting cap fitting etc.) Be sure:

1. **That any pressure in the chamber has been completely vented through the suction or discharge lines or other appropriate openings or connections.**
2. **That the driving means (motor, turbine, engine, etc.) has been "locked out" or made non- operational so that it cannot be started while work is being done on pump.**
3. **That you know what liquid the pump has been handling and the precautions necessary to safely handle the liquid. Obtain a material safety data sheet (MSDS) for the liquid to be sure these precautions are understood.**

Failure to follow above listed precautionary measures may result in serious injury or death.

ROTATION: Viking Mag Drive® pumps are designed to run in either direction. See **"Pump Rotation"**, page 9.

PRESSURE RELIEF VALVES:

1. Viking pumps are positive displacement pumps and must be provided with some sort of pressure protection. This may be a relief valve mounted directly on the pump, an inline pressure relief valve, a torque limiting device or a rupture disk. Do not rely on decoupling of magnets for protection from over pressure; this may result in damage to the magnets, pump, or other equipment.

SAFETY INFORMATION AND INSTRUCTIONS

IMPROPER INSTALLATION, OPERATION OR MAINTENANCE OF PUMP MAY CAUSE SERIOUS INJURY OR DEATH AND/OR RESULT IN DAMAGE TO PUMP AND/OR OTHER EQUIPMENT. VIKING'S WARRANTY DOES NOT COVER FAILURE DUE TO IMPROPER INSTALLATION, OPERATION OR MAINTENANCE.

THIS INFORMATION MUST BE FULLY READ BEFORE BEGINNING INSTALLATION, OPERATION OR MAINTENANCE OF PUMP AND MUST BE KEPT WITH PUMP. PUMP MUST BE INSTALLED, OPERATED AND MAINTAINED ONLY BY SUITABLY TRAINED AND QUALIFIED PERSONS.

THE FOLLOWING SAFETY INSTRUCTIONS MUST BE FOLLOWED AND ADHERED TO AT ALL TIMES.

Symbol Legend :

Danger - Failure to follow the indicated instruction may result in serious injury or death.

WARNING

Warning - In addition to possible serious injury or death, failure to follow the indicated instruction may cause damage to pump and/or other equipment.

BEFORE opening any liquid chamber (pumping chamber, reservoir, relief valve adjusting cap fitting, etc.) be sure that :

- Any pressure in the chamber has been completely vented through the suction or discharge lines or other appropriate openings or connections.
- The pump drive system means (motor, turbine, engine, etc.) has been "locked out" or otherwise been made non-operational so that it cannot be started while work is being done on the pump.
- You know what material the pump has been handling, have obtained a material safety data sheet (MSDS) for the material, and understand and follow all precautions appropriate for the safe handling of the material.

BEFORE operating the pump, be sure all drive guards are in place.

DO NOT operate pump if the suction or discharge piping is not connected.

DO NOT place fingers into the pumping chamber or its connection ports or into any part of the drive train if there is **any possibility** of the pump shafts being rotated.

WARNING

DO NOT exceed the pumps rated pressure, speed, and temperature, or change the system/duty parameters from those the pump was originally supplied, without confirming its suitability for the new service.

WARNING

BEFORE operating the pump, be sure that:

- It is clean and free from debris
- all valves in the suction and discharge pipelines are fully opened.
- All piping connected to the pump is fully supported and correctly aligned with the pump.
- Pump rotation is correct for the desired direction of flow.

WARNING

INSTALL pressure gauges/sensors next to the pump suction and discharge connections to monitor pressures.

WARNING

USE extreme caution when lifting the pump. Suitable lifting devices should be used when appropriate. Lifting eyes installed on the pump must be used **only** to lift the pump, **not** the pump with drive and/or base plate. If the pump is mounted on a base plate, the base plate must be used for all lifting purposes. If slings are used for lifting, they must be safely and securely attached. For weight of the pump alone (which does not include the drive and/or base plate) refer to the Viking Pump product catalog.

DO NOT attempt to dismantle a pressure relief valve that has not had the spring pressure relieved or is mounted on a pump that is operating.

AVOID contact with hot areas of the pump and/or drive. Certain operating conditions, temperature control devices (jackets, heat-tracing, etc.), improper installation, improper operation, and improper maintenance can all cause high temperatures on the pump and/or drive.

WARNING

THE PUMP must be provided with pressure protection. This may be provided through a relief valve mounted directly on the pump, an in-line pressure relief valve, a torque limiting device, or a rupture disk. If pump rotation may be reversed during operation, pressure protection must be provided on ***both*** sides of pump. Relief valve adjusting screw caps must always point towards suction side of the pump. If pump rotation is reversed, position of the relief valve must be changed. Pressure relief valves cannot be used to control pump flow or regulate discharge pressure. For additional information, refer to Viking Pump's Technical Service Manual TSM 000 and Engineering Service Bulletin ESB-31.

WARNING

THE PUMP must be installed in a matter that allows safe access for routine maintenance and for inspection during operation to check for leakage and monitor pump operation.

2. Relief valves are mounted as standard on the casing of all pumps.
3. If the pump rotation is to be reversed during operation, pressure protection must be provided on *both* sides of the pump.
4. The relief valve adjusting screw cap must always point towards the suction side of the pump, see **Figure 2**. If the pump rotation is reversed, remove the pressure relief valve and turn end for end (see **"Pump Rotation"**, page 9).
5. Pressure relief valves cannot be used to control pump flow or regulate discharge pressure.

For additional information on pressure relief valves, refer to Technical Service Manual TSM000 and Engineering Service Bulletin ESB-31.

CAUTION !

Rare earth magnets used in couplings have extremely strong magnetic fields capable of changing performance or damaging items such as the following:

Pacemakers
Metal Implants
Watches
Computers & disks
Credit Cards

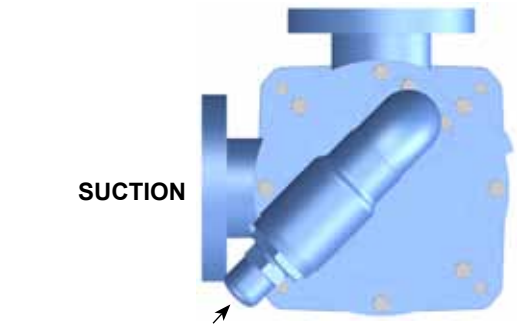


FIGURE 2 RELIEF VALVE POSITION

MAINTENANCE

Series 8124A, 8123A and 8127A pumps are designed for long, trouble-free service life under a wide variety of application conditions with a minimum of maintenance. The points listed below will help provide long service life.

CLEANING PUMP:

Keep the pump as clean as possible. This will facilitate inspection, adjustment and repair work.

LUBRICATION:

Bracket bearings require external lubrication. This must be applied slowly with a handgun to lubrication fittings every 500 hours of operation with multi-purpose grease, NLGI # 2. Do not over-grease. Applications involving very high or low temperatures will require other types of lubrication. Refer to ESB-515. Consult factory with specific lubrication questions.

STORAGE:

If the pump is to be stored, drain and pour non-detergent SAE 30-weight oil (or compatible alternative) into the pump port. Apply grease to the pump shaft, if present or accessible. Viking suggests rotating the pump shaft every 30 days to circulate the oil in the pump. The pump should be stored in a dry area.

SUGGESTED REPAIR TOOLS:

The following tools are required to properly repair Series 8124A, 8123A and 8127A pumps. These tools are in addition to standard mechanics' tools such as open-end wrenches, pliers, screwdrivers, etc. Most of the items can be obtained from an industrial supply house.

1. Soft face hammer
2. Allen wrench set (SAE)
3. Torque wrench with a locknut socket
4. Two feeler gauge sets
5. Arbor press
6. Brass bar
7. Hook style spanner wrench

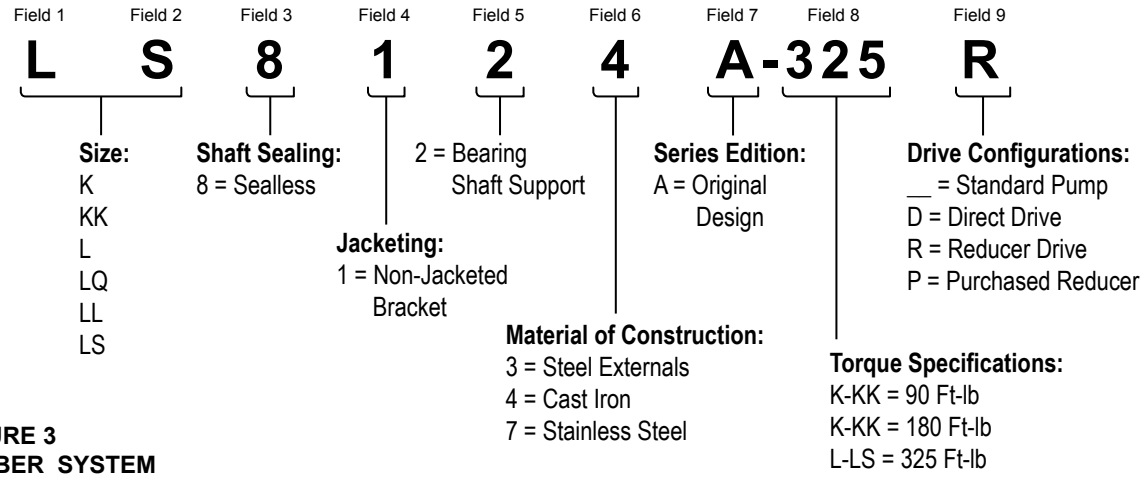


FIGURE 3
MODEL NUMBER SYSTEM

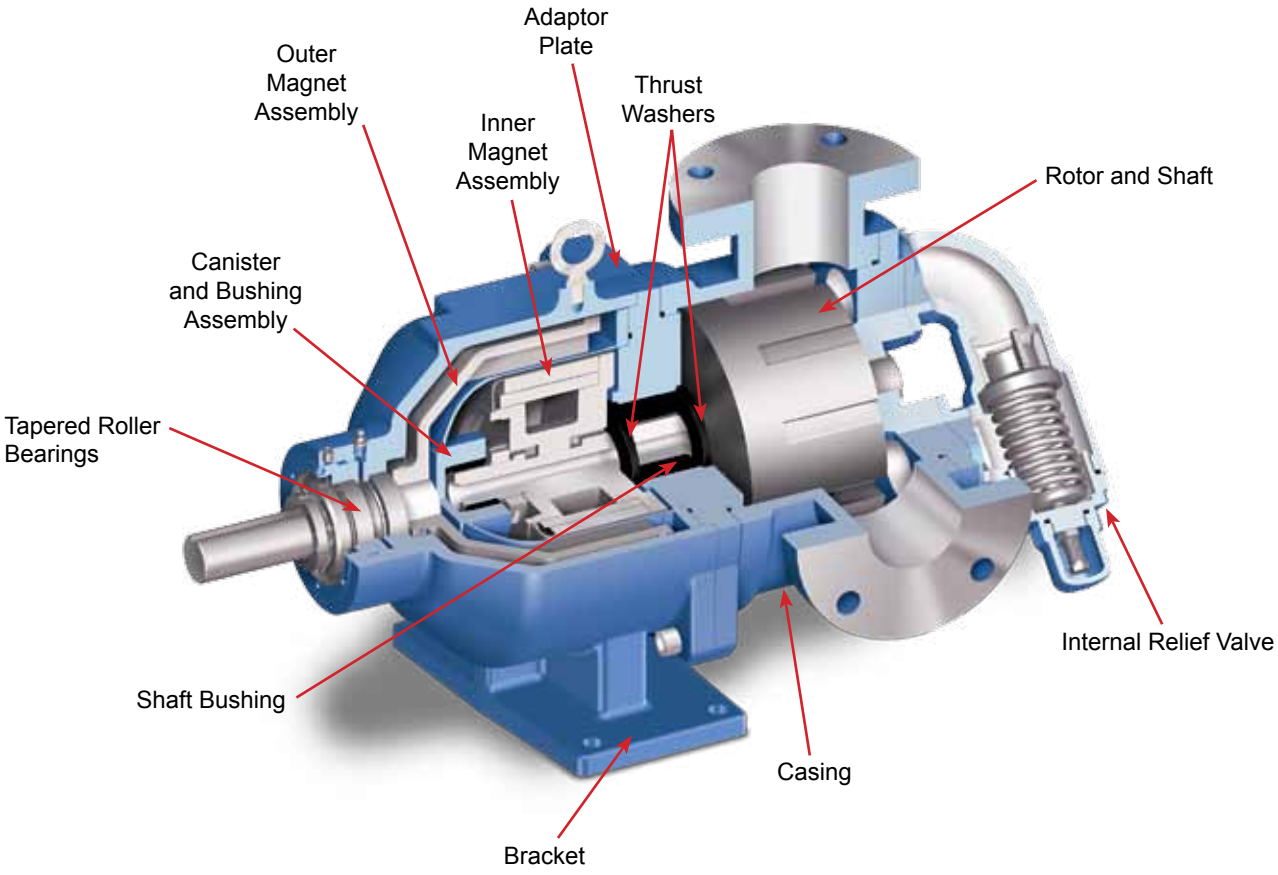
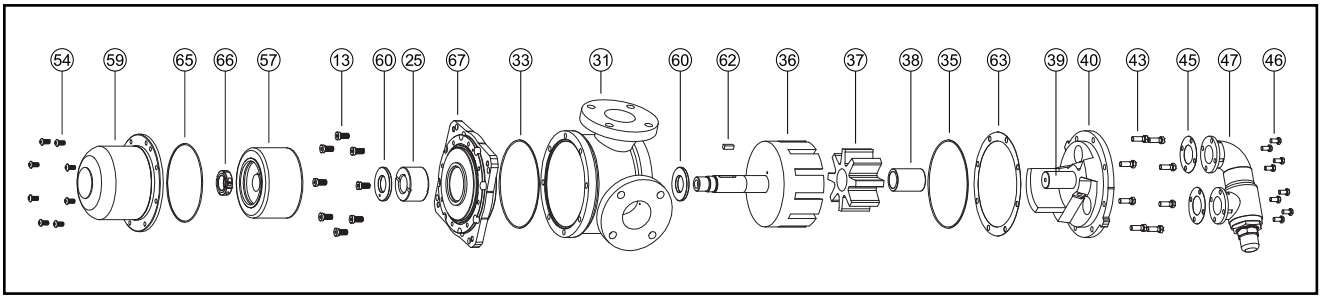
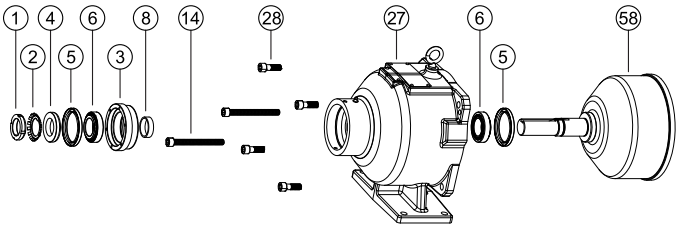


FIGURE 4
CUTAWAY VIEW OF UNIVERSAL MAG DRIVE PUMP



ITEM	NAME OF PART	ITEM	NAME OF PART	ITEM	NAME OF PART
13	Capscrews for Adaptor Plate (8-Req'd)	**39**	Idler Pin	**59**	Canister
25	Adaptor Plate Bushing	**40**	Head and Idler Pin Assembly	**60**	Thrust Washer (2-Req'd)
31	Casing	**43**	Capscrews for Head (6-8-Req'd)	**62**	Key for Rotor Shaft
33	Adaptor Plate O-Ring	**45**	Relief Valve Gaskets (2-Req'd)	**63**	Shims for Head
35	Head O-Ring	**46**	Capscrews for Relief Valve (8-Req'd)	**65**	Canister O-Ring
36	Rotor and Shaft Assembly	**47**	Relief Valve	**66**	Split Locknut
37	Idler and Bushing Assembly	**54**	Capscrews for Canister (8-Req'd)	**67**	Adaptor Plate
38	Idler Bushing	**57**	Inner Magnet Assembly		

FIGURE 5
EXPLODED VIEW – UNIVERSAL MAG DRIVE PUMP CANISTER THROUGH RELIEF VALVE



ITEM	NAME OF PART	ITEM	NAME OF PART	ITEM	NAME OF PART
1	Locknut	**5**	Lipseal (2-Req'd)	**27**	Bracket
2	Lockwasher	**6**	Tapered Roller Bearing (2-Req'd)	**28**	Capscrews for Mounting Bracket (4-Req'd)
3	End Cap	**8**	Inner Bearing Spacer	**58**	Outer Magnet Assembly
4	Outer Bearing Spacer	**14**	Capscrews for Disassembly (2-Req'd)		

FIGURE 6
EXPLODED VIEW – UNIVERSAL MAG DRIVE PUMP BRACKET AND OUTER MAGNET ASSEMBLY

PUMP DISASSEMBLY

WARNING!

Refer to DANGER & CAUTION listed on page 2 before proceeding.

1. Drain the liquid being pumped by removing the two drain plugs (if present). Both are located in the bottom of the casing. Once the liquid has drained, replace the plugs.
2. Refer to **Figures 5 and 6** for the names of parts.
3. Mark the head (40) and casing (31) before disassembly to insure proper reassembly.
4. To inspect the head and pin assembly (39 and 40) and idler and bushing assembly (37 and 38), remove the head capscrews (43).
5. Remove the head from the pump. If the casing was not drained in Step 1, be careful of the liquid draining out between the head and casing. Do not allow the idler to fall from the idler pin. Tilt the top of the pump head back during removal to prevent this. Avoid damaging the head shim set (63) since all shims are required to maintain end clearance.
6. Remove the idler and bushing assembly. Inspect the idler bushing for wear. If the idler bushing needs to be replaced, see **"Installation of Bushings"** on page 7. If further disassembly is required, proceed to the next step.
7. Remove the four socket head capscrews (28) securing the pump to the bracket. Support the pump with an overhead hoist, if possible.
8. Use the jackscrews (14) in the bracket to separate the inner magnet (57) from the outer magnet (58), see sequence in **Figure 7**. To keep the pump and bracket assemblies properly aligned and for additional safety, it is recommended to use 2 lengths of all-thread rod (6-8") threaded into diagonal capscrew locations in the adaptor plate and slide through the corresponding holes in the bracket.

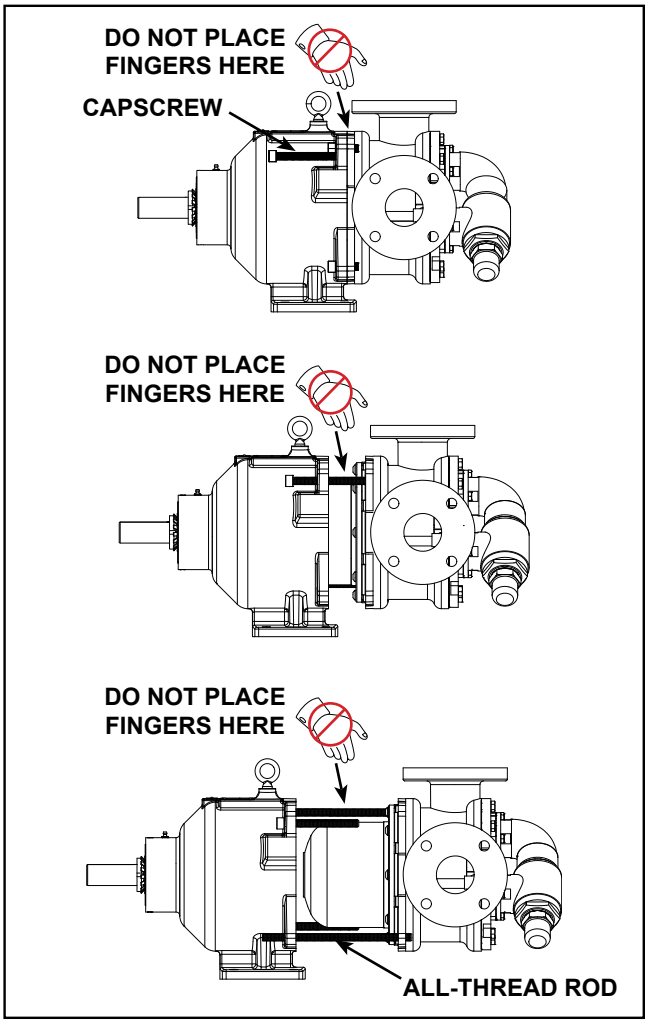


FIGURE 7
PUMP SEPARATION SEQUENCE

9. Visually inspect the outer magnets from the end of the bracket. If removal is necessary, separate the bracket from the motor. Remove the locknut (1), lockwasher (2) and outer bearing spacer collar (4) from the shaft. Slide the outer magnet assembly out of the bracket. Inspect the magnet assembly for damage or wear; replace if needed. If further disassembly of the bracket is required, see **"Disassembly / Assembly of Bracket Bearings"**, page 6.

10. Remove the socket head capscrews (54) from the canister (59). If the canister was not drained in Step 1, it will contain liquid. Use care when removing the canister from the pump by pulling it straight off. Inspect the canister bushing (64) for wear. If the canister bushing needs to be replaced, see **"Installation of Bushings"** on page 7.

11. Do not remove the O-ring from the plate adaptor (67) / canister unless it is bad, especially if it is PTFE (derivative) encapsulated. If a new O-ring is required, See **"Pump Assembly"** on page 7.

12. Insert a brass bar into the rotor (36) through a port between two rotor teeth and remove the split locknut (66), see **Figure 8**. Slide the inner magnet assembly off of the shaft. Make sure the outer thrust washer (60) does not come off with the inner magnet assembly. If the thrust washer hits the shaft key (62) it may crack or break. Do not forget this is a very strong magnet. Inspect the magnet assembly for damage or wear; replace if needed. If further disassembly is required, proceed to the next step.

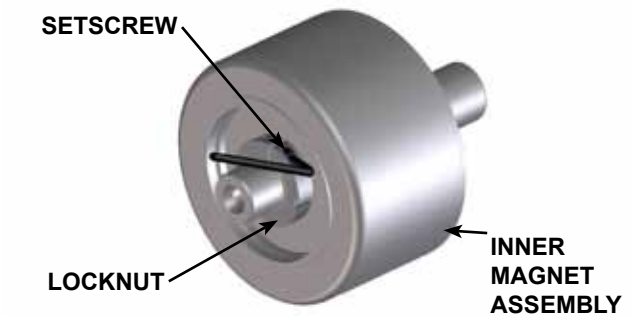


FIGURE 8
INNER MAGNET AND LOCKNUT ASSEMBLY

13. Remove the shaft key from the rotor shaft. Remove the outer thrust washer. The rotor and shaft (36) may now be removed by tapping on the end of the shaft with a soft face hammer (If a soft face hammer is not available a regular hammer may be used with a piece of hardwood). Remove the inner thrust washer from behind the rotor. Check the thrust washers for cracks or wear; replace if necessary.

14. Inspect the adaptor plate bushing. If the bushing needs to be replaced, see **"Installation of Bushings"**, page 7. Remove the socket head capscrews (13) from the adaptor plate. Slide the adaptor plate out of the casing.

15. Do not remove the O-ring from the plate adaptor / casing unless it is bad, especially if it is PTFE (derivative) encapsulated. If a new O-ring is required, See **"Pump Assembly"** on page 7.

16. Inspect the casing for wear, particularly in the area between the ports. Clean all other parts thoroughly and examine for wear or damage.

When making major repairs, such as replacing a rotor and shaft, it is advisable to also install a new head and idler pin, idler and bushing, and adaptor plate bushing. See **"Installation of Bushings"** on page 7.

DISASSEMBLY / ASSEMBLY OF BRACKET BEARINGS

DISASSEMBLY

The bracket bearing assembly features two tapered roller bearings, two lipseals, and one spacer. If further disassembly of this unit is required, proceed as follows:

1. Loosen the setscrews holding the end cap (3) in the bracket. Screw the end cap out of the bracket.
2. Inspect the bearings (6) for wear; replace as needed.
3. Inspect the lipseals (5) for wear; replace as needed. The lipseals will need to be replaced if removed.
4. If the bearings are worn it is recommended to replace the entire bearing. Remove the inner bearing spacer collar (8). Press the inner bearing cup (6) out of the bracket and the outer bearing cup out of the end cap. The bearings will need to be replaced if the cups are removed.

ASSEMBLY

1. If the bearing cups were removed, press the cup of the outer bearing into the end cap. Press the cup of the inner bearing into the bracket.
2. Press the inner lipseal into the bracket and the outer lipseal into the end cap and then lubricate the lipseals, see **Figure 9** for lipseal and bearing orientation.

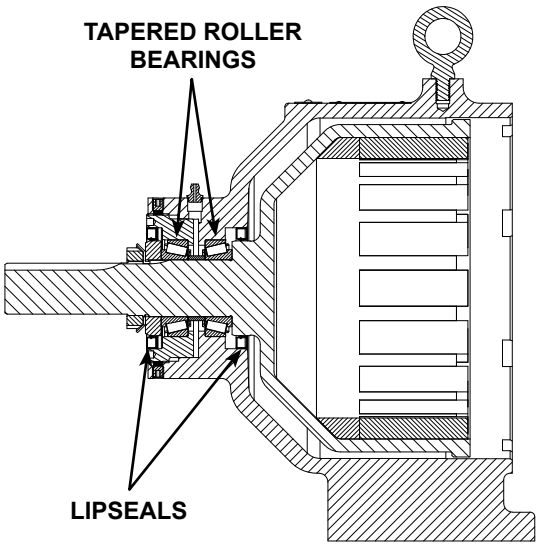


FIGURE 9
BRACKET BEARING AND LIPSEAL ORIENTATION

3. Screw the end cap into the bracket (clockwise) until it contacts. Do not over-tighten the end cap.
4. Inspect the outer magnet to make sure it has not picked up any foreign particles, which could damage the pump. Slide the inner roller bearing onto the shaft, followed by the inner bearing spacer.
5. Slide the outer magnet assembly into the bracket. Slide the outer roller bearing onto the shaft. Slide the outer bearing spacer collar onto the shaft and into the outer lipseal, followed by the lockwasher and locknut.
6. Tighten the locknut to 120-140 ft-lbs of torque and then bend over the appropriate lockwasher tab.
7. Unscrew the end cap (counterclockwise) by hand until there is considerable drag on the bearings. Mark the end cap and bracket in the same spot. Then screw in the end cap (clockwise) 5/16", radially from the mark. Tighten the end cap setscrews.
8. Grease the bracket using the bracket fitting with NLGI #2 grease. Make sure the shaft freely rotates by hand.

INSTALLATION OF BUSHINGS

CARBON GRAPHITE

The canister bushing requires a special fixture for proper assembly so the bushing is only sold as part of the canister assembly.

If attempting to install the carbon graphite idler or adaptor plate bushings, extreme care must be taken to prevent breaking. Carbon graphite is a brittle material and easily cracked. If cracked, the bushing will quickly disintegrate. Using a lubricant on the bushing and mating part will help facilitate installation.

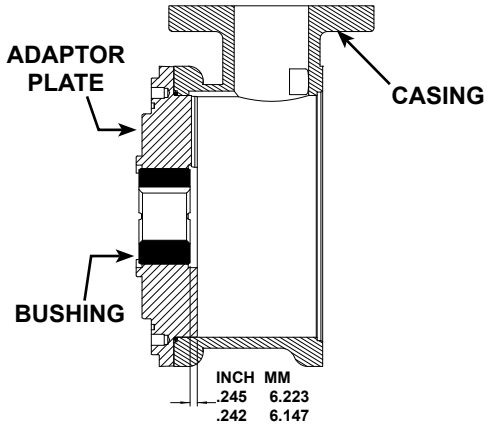


FIGURE 10
ADAPTOR PLATE BUSHING POSITION

The groove in the ID of the bushing should line up with the groove in the adaptor plate. **Figure 10** shows the proper position of the adaptor plate bushing after installation. This may require a special fixture to ensure proper positioning. Improper location may result in a pump with excessive slip, pre-mature wear or requiring a large number of shims. The additional precautions listed below must be followed for installation:

1. An arbor press must be used for the installation.
2. Be certain the bushing is started straight.
3. Do not stop the pressing operation until the bushing is in the proper position; starting and stopping will result in a cracked bushing.
4. After installation, check the bushing for cracks.

Use a suitable lubricant compatible with the fluid being handled when reassembling the pump.

Inspect all parts, especially drilled holes in the casing (for draining) to make sure they are not plugged. Replace any worn parts, remove any burrs and clean all parts before assembling the pump.

PUMP ASSEMBLY

DANGER !

Follow these directions exactly to avoid injury to self or damage to the pumping unit. Be careful to keep the inner and outer magnets at least (1) foot apart until step 14. Do not engage the magnets in any other fashion.

CAUTION !

Do not place fingers onto the front of pump mounting flange. Align the canister into bore of the bracket and gently slide it in. When the magnets start to engage, the unit will finish engagement on its own very rapidly unless the 1/2" x 5" capscrew is properly used. Make sure fingers are not on the front of the pump. See Sequence in Figure 13.

DANGER!

Be certain that the driving means (motor, turbine, engine, etc.) has been "locked out" or made non-operational so that it cannot be started while work is being done on pump.

1. If the adaptor plate O-ring needs to be replaced, apply a lubricant to the O-ring and place it onto the casing side of the plate adaptor. If the O-ring is PTFE (derivative) encapsulated, follow these special instructions.

   Do not attempt to reuse this type of O-ring if it has been removed. Immerse a new O-ring in boiling water for a few minutes. Remove it from the water and stretch out the O-ring. This ensures it will fit into the plate or groove without forcing the O-ring over a sharp edge. Run hot water over the O-ring until it shrinks down tight. Hot water makes the PTFE pliable and allows the inner elastomer to pull the PTFE back to the original size. Dry it with compressed air.
2. Position the adaptor plate so the adaptor plate groove aligns to groove in the casing bore at Port B, see **Figure 11** on page 8 (The adaptor plate in the K & KK models have a single groove, the L-LS models have a groove and two machined relief pockets.) Carefully slide the plate

adaptor into the bracket side of the casing. Use care to prevent cutting the O-ring with the edge of the adaptor plate or casing. Secure into position by tightening the eight capscrews.

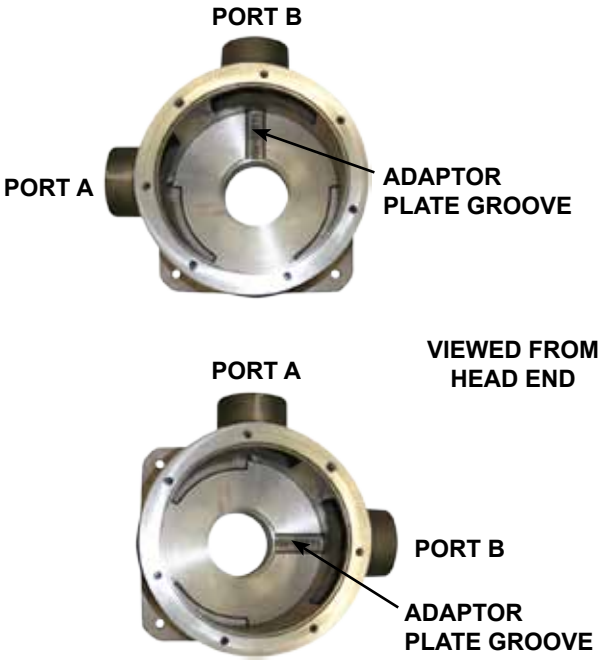


FIGURE 11
ADAPTOR PLATE / CASING POSITIONING
(L SIZE SHOWN)

3. Apply lubricant to the ID of the adaptor plate bushing. Clean the rotor and shaft so it is free of dirt, grit and other debris. Remove burrs around the keyway and shoulder of the shaft.
4. Place one thrust washer onto the shaft so that the blind hole in the thrust washer will line up with the drive pin on the back of the rotor. Slide the shaft into the adaptor plate bushing as far as it will go. Make sure that the thrust washer remains seated on the drive pin and flat against the rotor.
5. Slide the second thrust washer onto the shaft, drive hole facing out. Then install the key into the shaft.
6. Clean the face on the inner magnet that faces the casing. Slide the inner magnet onto the shaft and engage the pin of the magnet into the hole of the thrust washer. Install the split locknut with the raised face out, do not tighten completely.
7. Place two feeler gauges (0.002"), one on each side, between the adaptor plate bushing and the inner magnet thrust washer. Refer to **Figure 12**. This will establish the proper clearance for the thrust washers. Tighten the locknut until the feeler gauges are snug, but can still be removed. Do not remove the feeler gauges at this time.
8. Tighten the setscrew in the locknut. Check the feeler gauges. If the gauges are too tight, loosen the setscrew and locknut slightly and repeat tightening procedure. Remove the feeler gauges. Check to make sure the pump rotates freely by turning the inner magnet assembly.
9. Inspect the magnet to make sure it has not picked up any foreign particles, which could damage the pump.

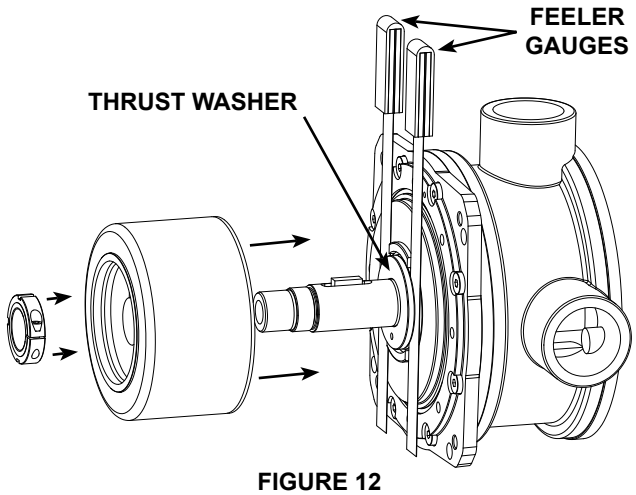


FIGURE 12
SETTING THRUST WASHER CLEARANCE

Inspect the canister bushing; replace if needed. See **"Installation of Bushings"** on page 7. Lubricate the ID of the canister bushing. Inspect the canister o-ring; replace if needed. Refer to Step 1 if PTFE (derivative) encapsulated. Lubricate and place the o-ring into the groove in the adaptor plate. Align the roll pin in the adaptor plate with the corresponding hole in the canister and place the canister onto the shaft. Secure the canister using eight capscrews.

10. If the old shims are not reusable or if any parts have been replaced, operating clearances will need to be re-established. Refer to **"Adjusting End Clearance"** on page 9. Otherwise, place the head shims on the head. The proper amount of shims should be used to provide the correct end clearance (0.008" for sizes K-LS). Inspect the head o-ring; replace if needed. Refer to Step 1 if PTFE (derivative) encapsulated. Lubricate the O-ring and place on the head.
11. Insure pipe plug is installed in the hole in the head, at the base of the idler pin, that aligns with the vertical groove in the adaptor plate. Plug will be slightly offset to CW side of groove. Insure the hole in the opposite side is unobstructed. **See Figure 14** on page 9.
12. Coat the ID of the idler bushing with a suitable lubricant and place the idler on the idler pin in the head.
13. The head can now be assembled onto the pump. Tilt the top of the pump head away from the pump slightly until the crescent enters the inside diameter of the rotor and rotate the idler until its teeth mesh with the rotor teeth. Secure the head to the casing using six to eight capscrews. Check the end clearance. Refer to **"Adjusting End Clearance"** on page 9, if needed. Rotate the shaft by hand to make sure it turns freely.

    The pump head and casing should have been marked before disassembly to insure proper reassembly. If not, be sure the idler pin, which is offset in the pump head, is placed between the port connections to allow for proper flow of liquid through the pump.
14. Inspect the bracket bearings and lipseals; replace if needed. Refer to **"Disassembly / Assembly of Bracket Bearings"**, page 6. Inspect the outer magnet for any steel objects, which may be attached. Remove any foreign material. Secure the bracket to a base or other stable platform. Rotate the outer magnet shaft by hand to make sure there is no interference. If rubbing

occurs, visually inspect for debris. Consult the factory if rubbing between the outer magnet and bracket persists.

15. Insert two fully threaded ½" X 5" socket head capscrews into the bracket until they are fully extended in front of the bracket to control assembling the pump, see **Figure 13**. To keep the pump and bracket assemblies properly aligned and for additional safety, it is recommended to use 2 lengths of all-thread rod (6-8") threaded into diagonal capscrew locations in the adaptor plate and slide through the corresponding holes in the bracket.

16 Inspect the canister to make sure it has not picked up any foreign particles, which could damage the pump.

Support the pump with a overhead hoist, if possible, while guiding the canister into the bracket opening. Back the capscrew off, being careful that the end of the capscrew is positioned in the counterbore hole of the adaptor plate. Secure the pump to the bracket with four capscrews.

Make certain that the power supply to the pump is "Locked-out". Check that the pump rotates freely by spinning the motor fan blades or pump shaft.

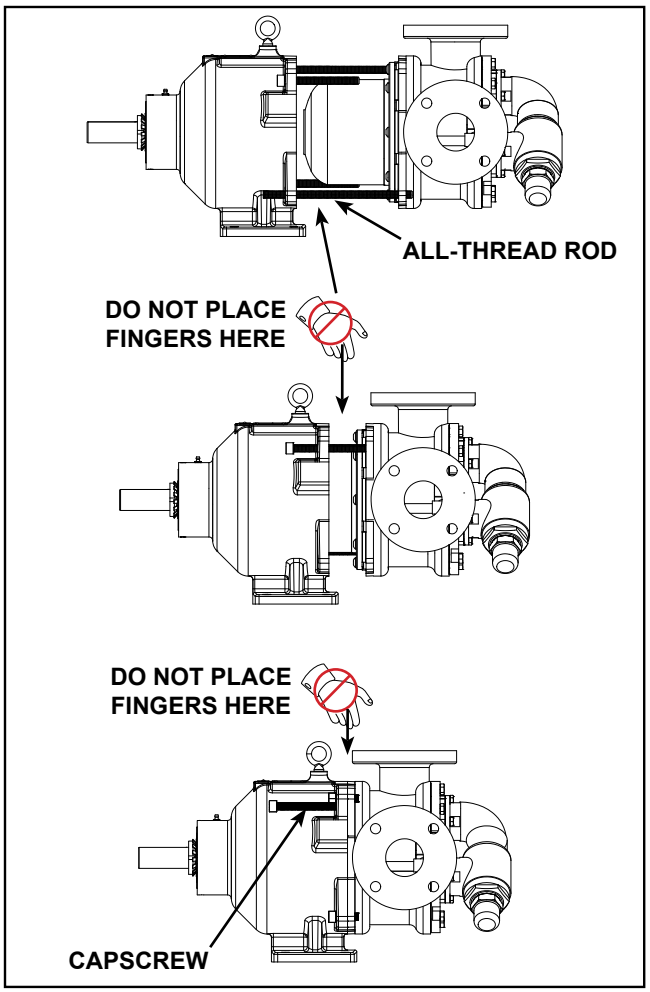


FIGURE 13
PUMP ASSEMBLY SEQUENCE

PUMP ROTATION

The pump is designed to operate in either direction. Process fluid is generally fed to the inner thrust washer and bushing interface and then through a groove in the bushing to the outer thrust washer. Then the fluid is pulled into the canister bushing and back through the hollow shaft and idler pin to the suction side of the pump. When the pump is operated in the opposite direction, the fluid flow is reversed, see **Figure 14.**

This figure is for illustrative purposes only.
Actual pump construction and location of ports varies.

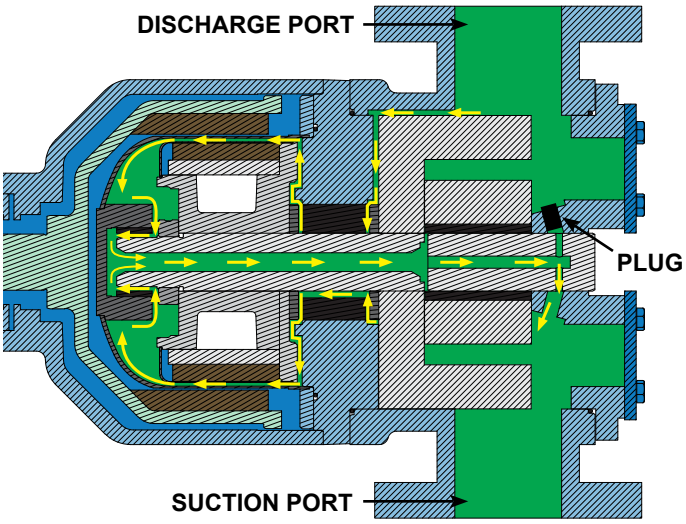


FIGURE 14
CIRCULATION OF LIQUID THROUGH UNIVERSAL MAG DRIVE PUMP

ADJUSTING END CLEARANCE

Standard end clearance of 0.008" is used on sizes K-LS. End Clearances are adequate for viscosities up to 2500 SSU / 540 cSt (SAE 40 lube oil at room temperature). Higher viscosities require additional clearances. As a general rule, the end clearance is doubled for higher viscosities. For specific recommendations on end clearance for high viscosity or for operating temperatures above 225°F (107°C), check with your Viking representative or consult the factory. Use either of the following procedures to properly adjust the end clearance when replacing shims or reassembling the pump.

PROCEDURE A

After the rotor has been installed and the locknut has been positioned and retained, insert a feeler gage of the proper end clearance into the port and between two rotor teeth, see **Figure 15**. With the idler on the idler pin, place the head into the pump casing. With the capscrews tight, the feeler gage should fit snugly; otherwise shims should be added or reduced in thickness until the proper clearance is attained.

FIGURE 15 PROCEDURE A

PROCEDURE B

If the pump is in line and ports are not accessible, remove the head and shims. Put the head back on (without shims) and measure the gap as shown, see **Figure 16**. After determining the gap between the head and casing, select a combination of shims equal to the measured gap plus the desired end clearance. Remove head, install shims then install head. Tighten the head capscrews and check the pump clearance by making sure the pump turns freely by hand.

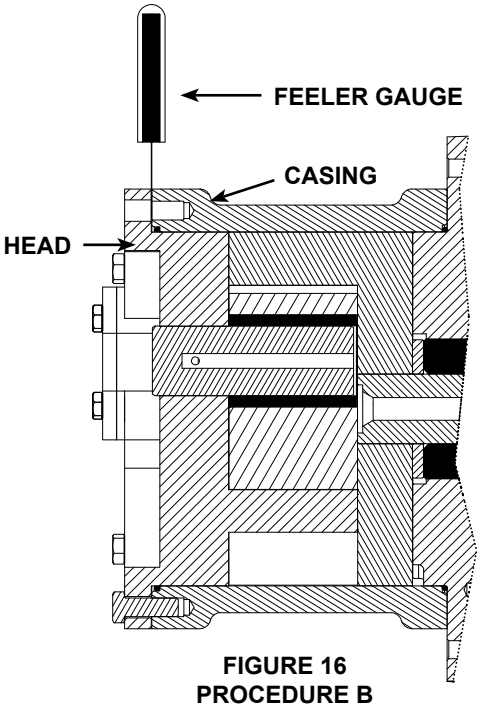


FIGURE 16
PROCEDURE B

PRESSURE RELIEF VALVE INSTRUCTIONS

DANGER !

Before opening any Viking pump liquid chamber (pumping chamber, reservoir, relief valve adjusting cap fitting etc.) Be sure:

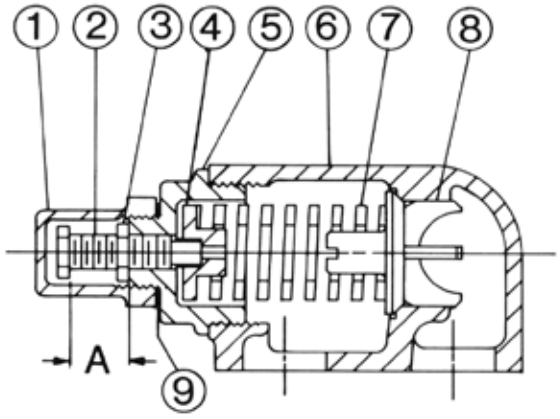
1. **That any pressure in chamber has been completely vented through suction or discharge lines or other appropriate openings or connections.**
2. **That the driving means (motor, turbine, engine, etc.) has been "locked out" or made non- operational so that it cannot be started while work is being done on pump.**
3. **That you know what liquid the pump has been handling and the precautions necessary to safely handle the liquid. Obtain a material safety data sheet (MSDS) for the liquid to be sure these precautions are understood.**

Failure to follow above listed precautionary measures may result in serious injury or death.

DISASSEMBLY – RELIEF VALVE

Mark the valve and head before disassembly to insure proper reassembly.

1. Remove the valve cap.
2. Measure and record the length of extension of the adjusting screw. Refer to **"A"** on **Figure 17**.
3. Loosen the locknut and back out the adjusting screw until spring pressure is released.
4. Remove the bonnet, spring guide, spring and poppet from the valve body. Clean and inspect all parts for wear or damage and replace as necessary.



VALVE - LIST OF PARTS			
1.	Valve Cap	**6.**	Valve Body
2.	Adjusting Screw	**7.**	Valve Spring
3.	Lock Nut	**8.**	Poppet
4.	Spring Guide	**9.**	Cap Gasket
5.	Bonnet		

FIGURE 17
VALVE – K, KK, L, LQ, LL AND LS SIZES

ASSEMBLY – RELIEF VALVE

Reverse the procedures outlined under **DISASSEMBLY – RELIEF VALVE.** If the valve is removed for repairs, be sure to replace in the original position. The relief valve adjusting screw cap must ***always*** point towards the suction side of the pump. If the pump rotation is reversed, remove the relief valve and turn end for end. Refer to **Figure 2**, page 3.

DANGER!

Before starting pump, be sure all drive equipment guards are in place.

Failure to properly mount guards may result in serious injury or death.

PRESSURE ADJUSTMENT

If a new spring is installed or if the pressure setting of the pressure relief valve is to be changed from that which the factory has set, the following instructions must be carefully followed.

1. Carefully remove the valve cap, which covers the adjusting screw.
2. Loosen the locknut, which locks the adjusting screw so pressure setting will not change during operation of pump.
3. Install a pressure gauge in the discharge line for the actual adjustment operation.
4. Turn the adjusting screw in to increase pressure and out to decrease pressure.
5. With discharge line closed at a point beyond the pressure gauge, gauge will show the maximum pressure valve will allow while the pump is in operation.

IMPORTANT

When ordering parts for the pressure relief valve, always give the model number and serial number of the pump as it appears on nameplate and name of the part wanted. When ordering springs, be sure to give pressure setting desired.

TROUBLESHOOTING

Some of the following may help pinpoint the problem:

Pump does not pump:

- Pump has lost its prime from air leak or low level in tank.
- Suction lift is too high.
- Pump is rotating in the wrong direction.
- The strainer may be clogged.
- The bypass valve is open, the pressure relief valve is set too low or the pressure relief valve poppet is stuck open.
- Improper end clearance.
- The pump is worn out.
- Are there any changes in liquid, system or operation that would influence pump or coupling performance, e.g. new liquid, additional lines or process changes?
- Temperature changes either in the liquid or the environment.
- The magnetic coupling is decoupling. Changes in application (temperature, pressure, viscosity, etc.) may require torque beyond coupling capabilities.

Pump starts, then loses its prime:

- The supply tank is empty.
- Liquid is vaporizing in the suction line.
- An air leak or air pocket in the suction line.

Pump is noisy:

- The pump is being starved (viscous liquid cannot get to pump fast enough). Increase the suction pipe size, reduce its length or slow down the pump.
- The pump is cavitating (liquid vaporizing in suction line). Increase suction pipe size or reduce its length.
- Check alignment.
- The magnetic coupling has decoupled. Shut off and let cool, then restart.

Pump is not delivering up to capacity:

- The pump is starving or cavitating - increase suction pipe size or reduce length or reduce pump speed.
- The strainer is partially clogged.
- An air leak somewhere in suction line.
- The pump may be running too slow. Is the motor at the correct speed and wired up correctly?
- The pressure relief valve is set too low, stuck open or has a damaged poppet or seat.
- The bypass line around the pump is partially open.
- The pump is worn out or there is too much end clearance.

Pump takes too much power (stalls motor):

- The liquid is more viscous than the unit is sized to handle.
- The system pressure relief valve is set too high.
- The bushings have frozen up or the liquid has set up in the pump.

CAUTION !

TO REDUCE THE RISK OF LEAKAGE WITH VIKING MAG DRIVE PUMPS, USERS SHOULD COMPLY WITH THE FOLLOWING GUIDELINES AND ADHERE TO THE FOLLOWING PROCEDURES:

- The pump configuration and materials used in a pump are tailored to the application for which it is ordered. Users should never use a pump for an application that is different from the application specified when the pump was ordered. This includes differences in liquid, speed, pressure, temperature or viscosity.
- Users must understand the characteristics of liquids they are pumping and be especially aware of any particulates in the liquid. Particulates can cause rapid wear of the bushings, especially if carbon graphite bushings are used. Hard bushings and hard shafts can reduce the risk of rapid wear, but the use of hard materials is not always the optimal solution. In applications involving non-abrasive, non-self lubricating liquids, carbon graphite bushings are typically the preferred material.
- Users should periodically inspect their pump for wear. This is especially critical and should be carried out with greater frequency when carbon graphite bushings are used or the same pump has not previously been used for the same application, including the same liquid, speed, pressure, temperature and viscosity. Users should promptly replace worn parts when they are discovered.
- Users should continuously monitor pumps that are handling hazardous liquids. This is especially critical for unmanned, remote locations. If a user does not have in-house expertise in the area of monitoring, it should contact a local engineering firm with monitoring experience.

VIKING PUMP

IDEX CORPORATION

WARRANTY

Viking warrants all products manufactured by it to be free from defects in workmanship or material for a period of one (1) year from date of startup, provided that in no event shall this warranty extend more than eighteen (18) months from the date of shipment from Viking. The warranty period for Universal Seal series pumps ONLY (Universal Seal models listed below) is three (3) years from date of startup, provided that in no event shall this warranty extend more than forty-two (42) months from the date of shipment from Viking.

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